Abstract approved

Jackson County, Oregon, is noted for the production of high quality pears. It is the fourth leading pear producing county in the United States and is the number one producer of winter pears. This thesis analyzes in detail the many aspects of the pear industry in the county.

Climate, soils, topography, and progressive growers have been the main localizing factors. The study revealed that 200 growers produce the average annual total of three million boxes of pears on 9940 acres of bearing orchards. The pears are prepared for market in 12 packing houses and two canneries. The industry has a direct impact on the county of $15,000,000.

The problems confronting the industry are caused by physical and biological factors. Spring frosts and hail damage are problems imposed by the climate. Pear Blight, Pear Decline, and Pear Scab are the main diseases. Insect pests such as the Pear Psylla and the Codling Moth must also be combatted. Urban encroachment has not yet been a serious problem in the county.

The future for the industry appears to be stable, with little change in acreage. The fruit gift box industry will become of increasing importance, thus creating further emphasis on producing winter pears.
THE AGRICULTURAL GEOGRAPHY OF
THE PEAR INDUSTRY IN JACKSON
COUNTY, OREGON

by

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The bibliography includes only these sources of information cited in the text of the thesis. To all others who have contributed to the author's knowledge of the subject under consideration, he conveys his gratefulness.
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CHAPTER ONE
INTRODUCTION

Purpose

Jackson County, Oregon, is the fourth leading pear producing area in the United States (35; 37, p. 70). Only the Sacramento, County, California, Santa Clara County, California, and Yakima County, Washington, surpass this southern Oregon county in total pear production. Of these four Jackson County alone has the distinction of bearing the name "The Winter Pear Capital of the World". This county accounts for approximately one-third of the winter pears grown in the United States (5, p. 1). Moreover, the quality of the Jackson County fruit is unexcelled, commanding the fanciest price on the market.

The importance of Jackson County as a pear producing region alone is sufficient reason for this study. There are two other factors, however, that influenced selection of this topic. First, the author has a basic interest in the area stemming from the fact that he has lived in the city of Medford, the center of the industry in the county, for 27 years. During this period he has worked in several phases of the industry. The second influential factor is the lack of published geographic appraisals respecting the pear industry in Jackson County. Survey of the literature did reveal some specific and some general material on the pear industry in Oregon, but there was not a publication that presented in a single volume a detailed geographical
analysis of the pear industry as it now exists in the county. The purpose of this study is to fill this void.

This thesis, therefore is concerned with the following questions: (1) What physical and human impactors have interacted to localize the industry in Jackson County? (2) What is the present nature of the industry? (3) What are its problems? (4) What is the role of the industry in the Jackson County economy? (5) What is the outlook?

Research Techniques

The material presented in this thesis is a product of correlation and synthesis of data obtained in a variety of ways. As noted the author began the study with some background. The first step in specific data gathering was a quest for printed material in the Oregon State University and Medford, Oregon, libraries. This proved to be relatively unrewarding since most of the information found dealt with specific details of the pear industry or was considerably out of date. Library investigation was followed by personal interviews to acquire detailed knowledge of the local industry and to update the published material. This phase also included work in the field to gain personal insight to substantiate information obtained in other ways and to take many of the photographs that appear in this study. Additional information was obtained through personal correspondence with individuals and agencies.
CHAPTER TWO
FACTORS INFLUENCING PEAR PRODUCTION AND POPULARITY

The pear is a popular fruit in Europe, with the countries of western Europe consuming over one-half of the total world production (23, p. 95). Even though the pear was one of the first fruits brought by the early settlers, its popularity in the United States has not matched that attained in Europe. The figures given below substantiate this conclusion.

PEAR CONSUMPTION, EUROPE, UNITED STATES, AND THE WORLD

<table>
<thead>
<tr>
<th></th>
<th>1961</th>
<th>Average 1956-1961</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000 Tons</td>
<td>1000 Tons</td>
</tr>
<tr>
<td>Europe</td>
<td>4180</td>
<td>2965</td>
</tr>
<tr>
<td>United States</td>
<td>624</td>
<td>713</td>
</tr>
<tr>
<td>World</td>
<td>6512</td>
<td>5223</td>
</tr>
</tbody>
</table>

Source: Production Yearbook, Vol. 15. 1961

In the United States the pear ranks far down the list of popular fruits. Its commercial importance follows that of the orange, apple, grape, peach, plum & prune, and the grapefruit (36, p. 889). On the market the pear competes most directly with the orange and apple. Compared to these two fruits the pear is of little significance. The data below show the production of these three fruits in the United States during 1962 (40, p. 34).

- Oranges .......... 260,527,000 Bushels
- Apples .......... 121,390,000 Bushels
- Pears .......... 29,100,000 Bushels
There are several reasons why the pear has failed to achieve marked popularity in the United States. Most significant are those related to environmental demands, biological restrictions, and keeping and shipping qualities.

**Environmental Needs of the Pear**

Although pear trees are tolerant of a rather wide range of climatic conditions, commercial culture has been restricted to areas that are particularly favorable to reliable production of quality fruit. Most commercial varieties require about 1,200 hours of temperature below 45 degrees F. during the winter months to permit them to complete a required dormant period which in turn favors vigorous spring growth (39, p.1,2). Most can stand fairly low winter temperatures without injury. If the trees are fully dormant, temperatures as low as -20 degrees F. usually cause little injury. In general, however, pear planting is considered questionable where temperatures lower than -20 to -25 degrees F. are likely to occur (39, p.2). Pears require warm days and cool nights to produce quality fruit. Date of ripening is determined by time of full bloom and by the temperatures in the six weeks after full bloom has occurred (4).

Air drainage and freedom from spring frost are important in the location of an orchard. Pears are relatively early bloomers. The blossoms are about as susceptible to damage by spring frosts as those of apples and peaches. Temperatures of 29 degrees F. or lower will generally kill the open blossoms (30, p.1). Temperatures of 30 degrees F. or below will kill the fruit while in the early formation stage (30, p.2).
Temperature has a definite effect on the quality of certain varieties. The Bartlett reaches its highest dessert and best shipping qualities where temperatures are around 70 degrees F. during the two months preceding harvest. The Bosc also appears to reach its highest dessert quality where temperatures are high. The Comice and Winter Nelis appear to adapt to the cooler conditions (39, p.2).

In most Pacific Coast sections irrigation is depended on for moisture, the main exceptions being in northwestern Oregon and western Washington; consequently, precipitation does not determine the distribution of pear production. Where precipitation is the source of soil moisture, an average of at least 35 inches per year is desirable (39, p.2).

Pears will grow well on a wider range of soils than most other orchard fruits. The trees will thrive on practically all orchard soils provided they have enough moisture and are well drained. Pears will do better on the heavy, sticky clays and adobe soils than most any other commonly grown fruit. They grow best, however, on deep fertile clay loam with a well-drained subsoil.

Biological Factors Affecting Popularity

Liability to loss by insects and disease is a great detriment to the popularity of the pear in America. The insect pests of pears are numerous. Codling Moth, *Carpocapsa pomonella*, attack the pear wherever it is grown. The Pear Psylla, *Psylla pyricola*, is another major insect pest that the pear grower must constantly combat.

The diseases of the pear are also numerous. The trees are more
susceptible to diseases under some combinations of climatic conditions than others. For example, long periods of high temperatures together with high humidity or precipitation are particularly limiting. Pear Blight, *Erwinia amylovora*, has long been the most serious disease of the pear. Blight has seriously limited the commercial pear production in the South and Midwest. Pear Scab, *Venturia pyrina*, is another major disease that must be controlled. Scab is more prevalent in areas that receive spring and summer precipitation. Recently another malady, Pear Decline, has become a serious threat to the pear industry.

**Commercial Factors Affecting Popularity**

Pears are at a disadvantage in competition with oranges and apples in having a much shorter period during which the fruit can be used. Pears cannot be kept in cold storage nearly as long as apples, and decay more quickly when brought into warmer temperatures. Pears kept out of cold storage have a very short market life, whereas oranges and apples can be kept on the market a longer period before the fruit begins to breakdown. During most of its season the pear also must compete with perishable summer and autumn plums and peaches.

Still another reason why pears have failed to gain marked popularity in the United States relates to their variability of quality. Varieties that should produce fruit of high quality fail to do so in unfavorable seasons, on unsuitable soils, or under neglect. Good pears can be grown only when environmental factors are favorable and good management practices are applied (14. p. 39).

Lastly, pears fall short of the apple and orange as commercial
products because they can not be handled as satisfactorily. Pears are more difficult to pack owing to shape and tender skin and do not stand transportation as well as apples or oranges. The demand for evaporated pears is slight in comparison with that for evaporated apples, and although perry, the juice of the pear, is refreshing as a drink, it is little known in the United States. The only commercial form in which pears exceed apples is in the canned product.

Thus for climatic, environmental, biological, and commercial reasons the pear industry has expanded the least of all the fruit industries in the United States. It has been largely the environmental factors that have resulted in the pear industry being limited to a few favorable localities where advantageous conditions exist. The three broad commercial pear growing areas in the United States are the Atlantic seaboard, around the Great Lakes, and the Pacific border (37, p.70). In the latter area the pear reaches its greatest development in the western hemisphere. Within this general area, however, pears are grown only in certain limited regions, one of which is the district in Jackson County.
CHAPTER THREE

THE EVOLUTION AND PRESENT STATUS OF PEARS
IN THE JACKSON COUNTY AREA

The Pear in the U.S.

Early fruit-growing records show the pear to be one of the first fruits grown in colonial America (14, p. 41). The early settlers introduced pears to New England where they apparently flourished. In those pioneer days, pears were grown largely from seeds rather than from buds or grafts. The sale of budded or grafted trees began in New York with the establishment of a nursery by Robert Prince at Flushing, Long Island, in 1730 (14, p. 50). As the population of the United States gradually expanded westward, pears were introduced into the favored localities in Ohio and Pennsylvania. Philadelphia was a center of pear growing in early America. The first Quakers planted some hardy trees. But it was not until after 1728, when John Bartram founded his famous botanical garden that Quaker plantings became of notable importance (14, p. 51). Bartram's garden soon became a distribution point from which pears were introduced into favored localities as the population continued westward.

It was probably the Franciscan monks that introduced pears to the Pacific coast when they established their missions in California. Early explorers of the Pacific area have left record of having observed flourishing pear orchards around many of these missions (14, p. 54).
The Pear in Oregon

The first pears were brought into the Oregon country in 1847 (6, p.193). Pear cuttings were carried overland by Henderson Lewelling and seeds by Joseph Geer. The first orchards were planted in the Willamette Valley. In the 1870s Findel Sutherlin planted the first large pear orchards in southern Oregon (6, p.193). Two important production areas emerged from these beginnings. The pear boom in Hood River County occurred after the 1919 freeze ruined the existing apple crop. Pears became an important commercial crop in Jackson County in the mid 1880s (5, p.1). The pear producing areas of the state as they now exist are shown in Figure 1.

The Pear in Jackson County

The first settlers in this county were from the midwest. Some had grown pears in that area.

Pears were introduced in the early 1850s, but the commercial fruit industry did not begin until 1884 (5, p.1). In that year J. H. Stewart planted the first commercial orchard. The next year J. D. Whitman planted 80 acres to apples and pears on a tract of land just north of Stewart Avenue, Medford. In the next six years several large orchards were planted (5, p.2,3).

The coming of the railroad in 1885 created a major stimulus for pear production. Now the growers had a means of marketing their surplus in the distant markets. The knowledge that transportation would be available suggested that pear growing would be a good investment. In 1890
Figure 1

DISTRIBUTION of PEAR GROWING in OREGON

each dot = 100 acres, or a part thereof

Source: Oregon State Experiment Station Bulletin 573
J. H. Stewart shipped 15 cars of pears which returned $4,000.00 (17). His financial success influenced others and in the years that followed many new orchards were planted. Shortly after World War I the present pattern was established.

The pear acreage in the county has fluctuated very little over the last 35 years. There has been around 10,000 acres of bearing and non-bearing trees during this time (4). The major changes have been in the variety of pears that are grown. As farmers have gained greater knowledge of both pear varieties and market potential the varieties planted here have been altered.

The Bartlett has wide market appeal, either as fresh or canned fruit. The D'Anjou, because it is a supreme winter pear, has maintained stable acreage. Just before the turn of the century a limited number of Comice were planted. When these trees reached bearing age about ten years later the crop was sold on the London market at a fantastic price ($10.05 per box) (22). This greatly stimulated the planting of this variety. But the Comice proved to be a light producer in later years and many of the growers became discouraged (5, p. 3). About this time the Bosc was beginning to produce heavy crops and was in demand due to its superior flavor. This resulted in the grafting of many of the Comice to Bosc (5, p. 3). In the mid 1930s the development of the fruit gift box industry by Bear Creek Orchards again popularized the Comice and the acreage increased.

Winter Nelis was another variety that was planted early in this region. This pear, because of its small size, unattractive appearance, and tendency to decay in storage, has almost been eliminated as a
commercial variety in Jackson County (11, p. 69). At one time there were 1,000 acres of Winter Nelis, now there are about 50 acres.

The gift box industry has been influential in the introduction of new varieties. One that has become popular is the Max Red Bartlett. This pear develops good color and high quality. These qualities appeal to consumers which would seem to guarantee continued interest in growing this variety for this facet of the market.

Since the Medford area was one of the earliest pear shipping districts in the West many of the innovations of the industry were perfected here. It was soon found that pears must be carefully packed if they were to reach the eastern markets in good condition. The first private packing house in the valley was built by J. H. Stewart in the early 1890s (5, p. 4). The first commercial packing house was built by J. D. Whitman shortly after. As the production increased more packing houses were built but this area has always packed the bulk of its fruit in a few commercial houses where the grade could be standardized at a high quality level (5, p. 4). At the present time there are 12 packing houses in the county.

There are several reasons why the pear industry grew and flourished in this area. In the first place, when Mr. Stewart brought his trees to the Rogue River Valley he did so because this area was free from the ravages of Pear Blight that plagued the tree in the Midwest (28). Secondly, a unique combination of climate and soils exist in the immediate Medford area which are particularly conducive to the production of high quality fruit. The importance of these last two factors will be considered in detail in the next chapter. These
natural advantages together with the progressive growers and packers have resulted in Jackson County pears being recognized world-wide as the highest quality, and the area's fame as the "Winter Pear Capital of the World".

In addition to the 600,000 boxes of Bartletts which are produced each year, the Medford District produces nearly 2,000,000 boxes of winter pears. (See figure 13.) The total output amounts to approximately one-tenth of all pears produced in the United States (37, p.70). Actually the above figure represents the market portion of the crop; because of the strict grading rules observed, a sizeable percentage of the fruit is sorted out as culls which are not sold.
The general topography of Jackson County is mountainous, dissected by the Rogue River and its tributaries. It is in one of these tributary valleys, the Bear Creek Valley, that pear production is concentrated. More specifically, it is centered about the city of Medford, hence the identifying name the Medford Pear District. The area that is generally suitable for growing pears and the Medford Pear District are shown in Figure 2. The floor of the Bear Creek Valley is level to gently rolling. The elevation at Medford is 1379 feet. The valley floor gives way to the foothills and the surrounding mountains, to peaks of 3000 feet on the east and over 7000 feet on the south. The general levelness of the valley and the abrupt rise of the mountains to the south can be seen in Figure 3. The valley floor and the gently-smooth sloping foothills provide growers with land that is well suited to the growth and cultural needs of pears.

Climate

The unique climate of this basin is one of the primary factors that caused the industry to prosper. The climate can be described as moderate, free from severe extremes. Those features of particular concern to the pear industry are lack of adequate precipitation, the characteristics of temperature, and the absence of severe winds.

Precipitation: Precipitation occurs in the winter and early spring
Figure 2

STUDY AREA
JACKSON COUNTY, OREGON

Area Generally Suited For Pears

Medford Pear District

Modoc Orchard
Hillcrest Orchard
Medford
Ashland
Figure 3

A photograph of the valley floor looking south toward the Siskiyou Mountains. Author's photograph.
months. The average annual precipitation figure recorded at the Medford Weather Station is 18.15 inches (41, p.227). This relatively low figure can be attributed to the mountain barriers that surround the valley, expressly those on the west. The recorded figure is considerably below the 35 inches per year that is necessary for pear production. For this reason all the orchards in the valley must be irrigated. Irrigation water is obtained from dammed reservoirs nourished by snow deposited on the surrounding mountains. Precipitation on the valley floor is primarily in the form of rain, with an average of only 7.6 inches of snow occurring annually (42, p.2). The 30 year monthly average precipitation figures for three valley stations are given in Part A of Figure 4. Precipitation variability in this area is not as great as commonly associated with low annual totals. The figures for the ten year period given below substantiate this conclusion (42, p.3).

**PRECIPITATION VARIABILITY**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AVERAGE ANNUAL TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>18.70 inches</td>
</tr>
<tr>
<td>1953</td>
<td>25.56 &quot;</td>
</tr>
<tr>
<td>1954</td>
<td>16.25 &quot;</td>
</tr>
<tr>
<td>1955</td>
<td>19.91 &quot;</td>
</tr>
<tr>
<td>1956</td>
<td>28.78 &quot;</td>
</tr>
<tr>
<td>1957</td>
<td>20.52 &quot;</td>
</tr>
<tr>
<td>1958</td>
<td>23.29 &quot;</td>
</tr>
<tr>
<td>1959</td>
<td>10.42 &quot;</td>
</tr>
<tr>
<td>1960</td>
<td>20.60 &quot;</td>
</tr>
<tr>
<td>1961</td>
<td>19.65 &quot;</td>
</tr>
</tbody>
</table>

The absence of summer precipitation has an advantage in this area in that some pear diseases flourish in summer humid areas.

**Temperature:** Few extremes of temperature occur in this localized climatic area. The average daily minimum temperature is a little below
### Figure 4

**PART A**

Average Precipitation (1931-1961)

<table>
<thead>
<tr>
<th>STATION</th>
<th>ELEV.</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medford</td>
<td>1379</td>
<td>2.51</td>
<td>2.02</td>
<td>1.51</td>
<td>1.19</td>
<td>1.22</td>
<td>.97</td>
<td>.17</td>
<td>.19</td>
<td>.65</td>
<td>1.91</td>
<td>2.67</td>
<td>3.13</td>
<td>18.15</td>
</tr>
<tr>
<td>Modoc Orchard</td>
<td>1215</td>
<td>3.78</td>
<td>2.53</td>
<td>1.95</td>
<td>1.32</td>
<td>1.36</td>
<td>1.16</td>
<td>.22</td>
<td>.20</td>
<td>.60</td>
<td>2.07</td>
<td>3.19</td>
<td>4.24</td>
<td>22.62</td>
</tr>
<tr>
<td>Ashland</td>
<td>1780</td>
<td>2.80</td>
<td>2.01</td>
<td>1.97</td>
<td>1.43</td>
<td>1.66</td>
<td>1.25</td>
<td>.22</td>
<td>.25</td>
<td>.93</td>
<td>1.89</td>
<td>2.66</td>
<td>3.16</td>
<td>20.15</td>
</tr>
</tbody>
</table>

**PART B**

Average Temperature (1931-1961)

<table>
<thead>
<tr>
<th>STATION</th>
<th>ELEV.</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medford</td>
<td>1379</td>
<td>37.2</td>
<td>42.6</td>
<td>47.2</td>
<td>52.3</td>
<td>58.7</td>
<td>64.9</td>
<td>71.8</td>
<td>71.1</td>
<td>64.4</td>
<td>54.5</td>
<td>44.2</td>
<td>38.5</td>
<td>54.0</td>
</tr>
<tr>
<td>Modoc Orchard</td>
<td>1215</td>
<td>37.3</td>
<td>42.1</td>
<td>46.7</td>
<td>52.3</td>
<td>58.3</td>
<td>63.8</td>
<td>70.7</td>
<td>69.9</td>
<td>64.0</td>
<td>54.1</td>
<td>43.9</td>
<td>39.3</td>
<td>53.6</td>
</tr>
<tr>
<td>Ashland</td>
<td>1780</td>
<td>37.4</td>
<td>41.5</td>
<td>45.4</td>
<td>51.0</td>
<td>56.7</td>
<td>62.0</td>
<td>69.0</td>
<td>68.3</td>
<td>61.0</td>
<td>53.4</td>
<td>44.2</td>
<td>39.2</td>
<td>52.6</td>
</tr>
</tbody>
</table>

**PART C**

Temperature Extremes (1931-1961)

| MEDFORD       | J   | F   | M   | A   | M   | J   | J   | A   | S   | O   | N   | D   |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Record High   | 68  | 74  | 86  | 92  | 100 | 105 | 115 | 108 | 107 | 97  | 75  | 65  |
| Record Low    | -3  | 6   | 16  | 21  | 28  | 31  | 40  | 41  | 29  | 20  | 15  | 3   |

freezing only during December and January; on just two occasions, since records were begun in 1911, have minimums reached zero or below. The first was ten below zero on December 13, 1919. The second was 3 below zero on January 11, 1930 (42, p.1). High temperatures in the summer months average slightly below 90 degrees, with extremes occasionally slightly above the 100 degree level. The highest temperature recorded was 115 degrees, occurring in July of 1946 (42, p.2).

The warm summer days are followed by cool nights which are conducive to quality fruit production. The average monthly temperatures for three valley stations are shown in Figure 4, Part B. Part C of Figure 4 presents some temperature extremes in Medford. The average length of the growing season in the Medford area is 171 days (42, p.1).

Growers are particularly concerned with the occurrence and dates of frost and freezing temperatures that occur in the spring. A recent publication has given the growers information they can use for the estimating the dates of low temperatures (8). This information will assist them in readying their orchards for frost control.

The climographs in Figure 5 present a visual representation of the regimen of precipitation and temperature in the Medford Pear District.

Wind: Due to the surrounding topography the winds are normally of light intensity averaging only 4.7 m.p.h. (42, 1). The winds prevail from the south in the winter and from the northwest the reminder of the year. The wind storm that occurred October 12, 1962 was an anomaly.
Figure 5

CLIMAGRAPHS of THREE VALLEY STATIONS

Source: Climatological Data, Oregon, Annual Summary, 1961
Thunderstorm activity in the summer months will often produce some intense winds of short duration. These storms will sometimes produce hail which can seriously damage the pear crop. Also, if the storm occurs in the harvest season it is quite likely that the winds will blow fruit off the trees and incur some wind-whip, punctures or bruise, damage.

**Soils**

Much of the soil in the Medford area is a rather heavy clay-adobe, and it is well suited for pears (33; 39, p.11). Although the soil is fertile, much of it is underlaid by a stratum of hardpan, at a depth varying from a few inches in some of the uplands to several feet in the bottom lands. In parts of this area a high water table presents a serious drainage problem. A comprehensive soil survey of Jackson County was made in 1911 (33). This survey is considerably out of date since much of the soil classification criteria has been altered. At the present time the Soil Conservation Service is conducting another soil survey of the county but it is not yet available. Due to this lack of a recent soil map and classification system the soils will be considered here in light of their capability.

According to the land capability classification established by the United States Soil Conservation Service all land is divided into eight broad classes (15). The first four classes include land which can be plowed and cultivated safely without lasting damage, if correct conservation procedures are followed. The remaining four classes are not suitable for cultivation. They need the protection afforded by a permanent cover of vegetation. Of the eight classes only four appear in the
Medford Pear District. The location of these four classes is shown in Figure 6. There is no class I land in the county. The land surrounding Medford is mostly class II or III land. In correlating the location of these classes and the location of the existing orchards as shown in Figure 7, it is apparent that most of the orchards are located on the better land. A description of the four classes in the district is presented below.

Class II Land: Good cultivable soil with gentle slopes, usually moderately deep. Some minor erosion problems. Frequently requires some moderate degree of protection (15).

Class III Land: Moderately good cultivable land. Usually moderate slopes, somewhat steeper than class II land; often shallow soils, moderate to severe erosion common. Some poor drainage on level land, with alkali in places. Needs careful protection from erosion, waterlogging, or other hazards (15).

Class IV Land: Fairly good land. Suitable for occasional cultivation, usually not more than one year in six. Best suited for hay or pasture, or for orchards if protected by a cover crop. Land of capability Class IV, because of special or local problems, can be used for seasonal or other crops under careful management (15).

Class VI Land: Well suited for grazing or forestry. Not arable because of steep slopes, susceptibility to erosion, shallow soils, alkali or other unfavorable conditions. Requires more careful range or woodland capability class V (15).
LAND CAPABILITY IN THE MEDFORD PEAR DISTRICT

Description of Capability Classes Found on Page 22.

Source: Oregon Agricultural Experiment Station Bulletin 530
Other Factors

Without a compatible physical environment the pear industry would not have flourished in the valley. But it was not the physical base alone that influenced the expansion of the industry. Compared to the Hood River industry, commercial pear growing in Jackson County received an early start. This allowed for experimentation with varieties, management techniques, methods of disease and insect control, and proper storing and shipping techniques. Until the growers had an efficient means to transport their fruit they were reluctant to invest in large orchard operations. The construction of the railroad in 1885 gave the growers a method of transportation and from this time on the commercial pear acreage expanded rapidly. In the interest of protecting and improving their newly established industry the orchardists banned together in the Fruit Growers League in 1914. The League has a continuous record of research projects concerned with improving the many phases of the industry (35).

Another major factor in perpetuating the industry in the county has been the work of the branch experiment station. This station was instrumental in conducting research that led to the control or Pear Blight that threatened to wipe out the industry in the early 1920s (28).

Here, then in the Medford area there is a combination of factors, both physical and human, that have been influential in establishing and continuing the pear industry. The physical base has imposed some minor problems, but the growers have utilized modern technology and efficient agricultural practices to overcome these limitations.
CHAPTER FIVE
CHARACTER AND STRUCTURE OF THE INDUSTRY

The pear industry as it exists in the county consists of two distinct aspects, basic field production and fruit processing and packing. The two are obviously interrelated, but the features of the two differ considerably. For this reason the two will be considered separately.

Basic Field Production

According to the 1959 Census of Agriculture there were 1,908 farms in Jackson County. Of this total there are about 220 pear growers that belong to the Fruit Growers League. This indefinite figure can be explained by the fact that there are always a few orchards that are in the process of changing ownerships. This figure also includes the multiple ownerships. So in effect there are about 200 pear growers in the valley (4). Of this total 170 growers operate 50 acres or less. There are 30 growers that operate orchards with 50 acres or more. /1 This figure for the total number of growers includes only the commercial growers. There are many farms that have pear trees but the fruit is not sold to the packing houses or canneries. The crop is consumed by the farm unit.

The following map, Figure 7, shows the location of the bearing and non-bearing orchards that presently exist in the county.

The first orchardists in the county planted Bartlett, D'Anjou, Bosc, and Comice. As can be seen from the figures below, these four

/1 A record of the size and owner of each orchard in the county is maintained but this information is confidential.
EXISTING PEAR ORCHARDS IN THE MEDFORD PEAR DISTRICT

Source: The Resource Base of Jackson County, Oregon, 1960, updated by author in 1962
varieties are still the most important commercial varieties grown. A comparison with the other five commercial varieties is also presented.

**ESTIMATED PEAR ACREAGE IN JACKSON COUNTY**

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>1961</th>
<th>1950</th>
<th>1940</th>
<th>1930</th>
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<tbody>
<tr>
<td>Bartlett</td>
<td>4000</td>
<td>3900</td>
<td>3200</td>
<td>3860</td>
</tr>
<tr>
<td>D'Anjou</td>
<td>2900</td>
<td>2850</td>
<td>2650</td>
<td>2600</td>
</tr>
<tr>
<td>Bosc</td>
<td>1700</td>
<td>2000</td>
<td>2400</td>
<td>3025</td>
</tr>
<tr>
<td>Comice</td>
<td>900</td>
<td>850</td>
<td>750</td>
<td>740</td>
</tr>
<tr>
<td>Red Bartlett</td>
<td>250</td>
<td>300</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Seckel</td>
<td>110</td>
<td>100</td>
<td>100</td>
<td>210</td>
</tr>
<tr>
<td>Packham's Triumph</td>
<td>100</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Winter Nelis</td>
<td>50</td>
<td>100</td>
<td>500</td>
<td>940</td>
</tr>
<tr>
<td>P. Barry</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Howell</td>
<td>----</td>
<td>50</td>
<td>150</td>
<td>260</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>9940</td>
<td>10,180*</td>
<td>9780*</td>
<td>11,665*</td>
</tr>
</tbody>
</table>

*Includes non-bearing acreage

Source: C. B. Cordy, Jackson County Extension Agent

To determine the number of trees per variety that are now existing in the county the acreage for each type is multiplied by seventy (4). Using this formula the number of trees in 1961 would be as follows:

- Bartlett........... 280,000 trees
- D'Anjou............ 203,000 "
- Bosc............... 119,000 "
- Comice............... 63,000 "
- Red Bartlett....... 17,500 "
- Seckel............... 7,700 "
- Packham's Triumph 7,000 "
Winter Nelis........ 3,500 trees
P. Barry.......... 2,100 "
TOTAL............ 699,800 Trees

Each commercial variety grown in the Medford Pear District has its own unique characteristics and advantages and disadvantages. Each variety will be considered separately to better understand its commercial value.

The Varieties

The Bartlett is the most popular pear grown in the county. The most important character of the Bartlett that is responsible for its popularity is its tolerance to the climate and the various soil types existing in the county. It is a dependable producer, yielding good crops year after year. The pears are of very good quality, and they store and ship well.

The main disadvantage in growing this pear is that the trees blight badly (11, p.47). Although other Medford District pears are of superior flavor, the Bartletts of this area are above average quality compared with those grown in other areas; and since no other variety is so easily grown here, nor as reliable on the markets, the Bartlett promises to maintain its position in the county.

The physical characteristics of the Bartlett are as follows;

Tree medium in size, tall pyriform, upright, hardy, very productive, branches stocky, smooth, reddish-brown overlaid with ash-gray scarf-skin, with few lenticels; branchlets short, with short internodes, reddish-brown, glossy, smooth, glabrous, with conspicuous lenticels.

Leaf-buds short, obtuse, pointed, mostly free; leaf-scars prominent. Leaves 2 3/4 inches long, 1 2/3 inches wide, oval leathery; open taper-pointed, margin tipped with small dark red glands, finely serrate; petiole 1 3/4 inches long. Flower-buds large, conical, pointed, free; flowers showy, 1 1/4 inches across, in dense cluster averaging seven buds in a cluster; pedicels 1 1/8 inches long, slender, slightly pubescent.
Fruit matures in August; 3 3/8 inches long, 2 3/8 inches wide, oblong-obtuse-pyridiform, tapering toward the apex, symmetrical, uniform; 1 1/8 inches long, often curved, thick; cavity small, usually lipped, with thin, oversoreading streaks of light russet, acute, shallow; calyx partly open; lobes separating at the base, narrow, acute; basin very shallow, narrow, obtuse, furrowed and wrinkled; skin thin, tender, smooth, often dull, the surface somewhat uneven; color clear yellow, with a faint blush on the exposed cheek, more or less dotted with russet and often thinly russeted around the basin; dots many, small, conspicuous, greenish-russet; flesh fine-grained although slightly granular at the center, melting, buttery, very juicy, vinous, aromatic; quality very good. Core large, closed, with clasping core-lines; calyx-tube long, wide, funnel-shaped; seeds wide, plump, acute (14, p.125).

A picture of the Bartlett is shown in Figure 8.

The Beurre D'Anjou is the second most important pear grown in the terms of acreage. (See figure 9.) It is an excellent winter pear, and the fruit is attractive and of high quality. The trees are relatively free from blight, grow rapidly, and bear a late crop. The most serious fault of this variety is that it is an uncertain cropper (11, p.48). Its physical characteristics are as follows:

Tree large, vigorous, spreading, hardy; trunk smooth; branches slightly zig-zag, covered with gray scarfskin over reddish-brown, with few small lenticels; branchlets long, with long internodes, reddish-brown tinged with green, smooth, glabrous, with many conspicuous, raised lenticels.

Leaf-buds small, short, obtuse, nearly free. Leaves 3 1/2 inches long, 1 1/2 inches wide, elongated-oval, thin leathery; apex taper-pointed, margin nearly entire or crenate; petiole two inches long. Flower-buds large, long, conical, plump, free; flowers 1 3/8 inches across, showy, in dense clusters, from eight to 12 buds in a cluster; pedicels 1/2 inch long, very thick, pubescent, green.

Fruit matures in September; large, 3 1/2 inches long, three inches wide, uniform in size, oblong-obovate-pyridiform, with surface irregular in outline, sides slightly
Figure 5

A Bartlett pear.  
Author's photograph
Figure 9

A Beurre D'Anjou pear.
Author's photograph
unequal, uniform in shape; stem 1/2 inch long, short, very thick and woody; cavity obtuse, shallow, russeted and furrowed, usually lipped; calyx open; lobe separated at the base, long narrow, acuminate; basin shallow, narrow, obtuse, smooth, symmetrical and regular; skin thin, tender, smooth, dull; color green, clouded with russet around the basin and occasionally with very fine russet lines and markings; dots many, small, russet, conspicuous; flesh yellowish-white, firm, but slightly granular, tender, buttery, very juicy, sweet and spicy, with a rich, aromatic flavor; quality very good. Core large, closed; core-lines clasping; calyx-tube short, wide, conical; seeds large, wide, long, plump, acuminate, tufted at the tips (14, p. 129).

The Beurre Bosc, Figure 10, ranks third in acreage. It is one of the most attractive of all pears. The quality of the fruit is very good to best. The fruits seldom crack, scab, or mildew (14, p. 130). There are, however, a few problems associated with this pear. The trees are slow in bearing, and are somewhat tender to cold and susceptible to blight. The physical characteristics of the Bosc are as follows;

Tree medium in size, vigorous, upright-spreading, hardy, productive, not an early bearer; trunk stocky; branches smooth, brownish, covered with ash-gray scarf-skin, with large lenticels; branchlets brownish, tinged with gray, glossy, smooth, nearly glabrous, with slightly raised, conspicuous lenticels.

Leaf-buds obtuse, pointed, appressed; leaf-scars prominent. Leaves three inches long, 1 7/8 inches wide, ovate, thick, leathery; apex taper-pointed; margin finely crenate; petiole 1 1/4 inches long. Flower-buds large, conical, pointed, free; flowers open early, 1 1/2 inches across, showy, in dense clusters, from ten to 20 buds in a cluster; pedicels one inch long, slightly pubescent, light green.

Fruit matures in October; large 3 3/8 inches long, 2 3/4 inches wide, uniform in size, acute-ovobate-pyriform, with a very long, tapering neck, uniform in shape and very symmetrical; stem 1 1/2 inches long, curved; cavity very obtuse or lacking, occasionally very shallow and narrow, wrinkled, russeted, with a fleshy ring folded up around the stem, slightly lipped; calyx open, small; lobes short,
Figure 10

A Beurre Bosc pear.
Author's photograph
broad, obtuse; basin very shallow, narrow, obtuse, smooth, symmetrical; skin slightly granular, tender, roughened by russet, dull; color dark yellow, overspread with thick, dark russet, laid on in streaks and patches, with a cheek of solid russet; dots small, light russet, obscure; flesh yellowish-white, slightly granular, tender and melting, buttery, very juicy, with a rich, delicious, aromatic flavor; quality very good to best. Core large, closed, with clasping core-lines; calyx-tube short, wide, conical; seeds wide, short, plump, obtuse (14, p.131).

The Doyenne' Du Comice, Figure 11, is the fourth leading variety produced in this area. The quality of this pear is considered by many to be the very best. It is for this reason that the Comice is the base variety used in the fruit gift boxes packed in the county. It costs more to harvest the Comice, owing to gift box quality requirements but the higher price received by the growers justifies the extra cost necessary during harvest. There are only a few disadvantages in growing this pear. The trees are somewhat susceptible to blight and become uncertain bearers in some circumstances (11, p.25). The physical characteristics of the Comice are as follows;

Tree vigorous, characteristically upright, dense, usually productive; branches smooth, dull gray mingled with greenish-brown, marked with large, lenticels; branchlets long, brown tinged with red, glabrous, with many small, slightly raised, conspicuous lenticels.

Leaf-buds large, medium to long, conical, pointed, nearly free; leaf-scars prominent. Leaves 3 1/4 inches long, 1 1/2 inches wide, oval, leathery; margin finely serrate; petiole two inches long. Flower-buds short, conical, free; blossoms open late; flowers 1 1/4 inches across, in dense clusters, about eight buds in a cluster; pedicels 7/8 of an inch long, slender, pubescent, light green.

Fruit matures in September and October; large, three inches long, 2 3/4 inches wide, obovate-obtuse-pyriform or roundish, with equal sides; stem 1 1/4 inches long, very thick, usually curved; cavity
Figure 11

A Doyenne Du Comice
Author’s photograph
obtuse, shallow, narrow, russeted and wrinkled, often with a fleshy ring around the base of the stem; calyx open; lobes separated at the base, long, narrow, acuminate; basin medium to wide, obtuse, often furrowed; skin tough and granular, smooth except for russet markings, dull; color clear yellow, often with a faint russet-red blush on the exposed cheek, the surface heavily covered with large patches and nettings of attractive russet; dots many, small, dark brown, obscure; flesh tinged strongly with yellow, fine-grained near the outside but granular toward the core, melting, tender, buttery, very juicy, sweet and vinous, aromatic; quality very good to best. Core closed, with clasping core-lines; calyx-tube short, wide, conical; seeds large, wide, long, rather plump, acute, often abortive (14, p.154).

Figure 12 shows the four main varieties grown in the county.

The relative size, shape, and coloring of these pears can be observed.

Compared to the four leaders the other five commercial varieties are of relatively little importance. They have certain qualities, however, that have encouraged limited production. The P. Barry is a late ripening winter pear, satisfactory for late season market. This pear has an additional commercial advantage over other winter pears in that the quality of the fruit, when properly ripened, is unexcelled. Several disadvantages have limited production. The fruits sometimes fail to ripen and will instead shrivel up until decay sets in (14, p.203). Furthermore the trees are uncertain bearers.

The Seckel, another minor variety grown in the county, is a very vigorous and productive pear. The trees are somewhat immune to blight, and the fruit is unequalled in dessert quality commanding a top market price (11, p.62). The smallness of its fruit is a major disadvantage; the cost of picking is about double that for larger varieties.

Another pear that has become of some significance is the Max Red
Figure 12

A comparison of the four major pear varieties.
Author's photograph
Bartlett. This pear has attained commercial value only in the last ten years. It is a bud mutation of the Bartlett and is identical with the Bartlett in size, form, and desset quality, but develops intense red color under the climatic and cultural conditions existing in the county (11, p. 57). Its color has created interest in its use as a gift box pack.

The Winter Nelis has almost been eliminated as a commercial pear. Only fifty acres of Winter Nelis remain in the county. It has lost out commercially due to its small size, unattractive appearance, and a tendency to decay in storage (11, p. 69).

The last variety that is grown commercially in the county is Packham’s Triumph. It is new to this area, being planted only in recent years. It resembles the Bartlett in many features but the skin is rougher. The trees are moderately vigorous, upright in habit, and productive. They also are very susceptible to blight and scab (11, p. 59).

At the present time there are approximately 1500 acres of non-bearing orchards in the county. The main variety on these acres is Old Home. The importance of this pear does not stem from the quality of the fruit. Its value comes from the fact that the tree is vigorous, well formed, and highly resistant to Pear Blight (11, p. 59). Thus Old Home is used for blight-resistant trunk and framework stock.

**Yields:** A factor that is of considerable importance to the individual grower is the yields he obtains from his productive acres. Yields are determined by several factors. Among these are the location of the orchard with respect to air drainage and soils, and the cultural
practices employed by the grower. Yields are important, but the majority of the growers will not sacrifice quality for mere quantity. The market for Medford District pears has been won on the basis of quality, and the future depends upon maintaining the quality reputation. There is some difference in the yield per acre, but the differences are not substantial. The five year average per acre yield from 1955 to 1959 was 300, 48 pound boxes, for all commercial varieties (4). This is a considerable increase over the 187 boxes per acre received in 1923 (17).

Production: Figure 13 shows a production comparison of the commercial varieties. From this chart trends for the individual varieties can be ascertained. The figures given for the year 1954 illustrate the effects that a serious freeze can have on the industry. In that year over 50 percent of the crop was lost due to the late freeze occurring on April 30th.

Size of Economic Units: One of the major problems that pear growers have to face in recent years is the increase in size of the basic economic unit that is necessary to return a reasonable profit. The price per box that the grower received from the packer for his fruit has remained relatively stable over the years while the cost of producing the fruit has increased almost threefold (17; 32). Some growers have found that their acreages are no longer sufficient to yield an adequate family income. This has led some small growers to remove their trees and incorporate orchards into existing field crop or livestock enterprises, or to sell or lease their orchards to large growers. It has been estimated that a 40 acre orchard is the bare minimum for an economic
FIGURE 13

<table>
<thead>
<tr>
<th>YEAR</th>
<th>P. Barry</th>
<th>Bartlett</th>
<th>R. Bart.</th>
<th>Bosc</th>
<th>Comice*</th>
<th>Anjou</th>
<th>W. Nelis</th>
<th>Seckel</th>
<th>Packham's Triumph</th>
<th>42 lb. box Total</th>
<th>Cannery total in equivalent 42 lb. box</th>
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<tbody>
<tr>
<td>1959</td>
<td>11,994</td>
<td>449,534</td>
<td>31,880</td>
<td>349,729</td>
<td>91,061</td>
<td>762,698</td>
<td>14,521</td>
<td>33,541</td>
<td>9,021</td>
<td>2,312,049</td>
<td>558,070</td>
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<tr>
<td>1958</td>
<td>17,510</td>
<td>736,402</td>
<td>30,233</td>
<td>694,906</td>
<td>66,174</td>
<td>802,638</td>
<td>19,201</td>
<td>38,287</td>
<td>6,877</td>
<td>2,995,503</td>
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<td>17,215</td>
<td>733,909</td>
<td>28,296</td>
<td>567,360</td>
<td>129,443</td>
<td>973,893</td>
<td>13,368</td>
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<td>38,070</td>
<td>642,861</td>
<td>92,190</td>
<td>1,119,244</td>
<td>20,102</td>
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<td>884,670</td>
<td>30,964</td>
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<td>458,516</td>
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<tr>
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<td>11,075</td>
<td>954,464</td>
<td>4,444</td>
<td>726,603</td>
<td>139,462</td>
<td>809,389</td>
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<td>23,872</td>
<td>2,687,337</td>
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<td>107,017</td>
<td>871,172</td>
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<td>61,749</td>
<td>683,355</td>
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<td>20,790</td>
<td>2,130,169</td>
<td>404,761</td>
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<td></td>
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</table>

* Includes only fresh fruit sold.  
Source: Shelby Tuttle, Executive Secretary. Fruit Growers League.
unit. Sixty acres is considered a better investment, and a grower with 100 acres or more has the very best economic unit (4). The increase in the necessary acreage is a very real problem here since 175 of the growers in the county own 50 acres or less.

Labor: Three categories of labor may be noted in the basic field aspects of the industry, owners-operators, the fulltime hired workers, and the seasonal hired workers for pruning, heating, and harvesting. The small grower will employ men to perform the cultural practices and the harvesting operations. His acreage is too small to keep a full-time crew. Most of the larger orchards have a full-time crew to perform the many cultural practices. During the harvest season this crew is supplemented by the seasonal workers. Full-time workers are obtained from local sources. Many of the harvest season workers also come from the local labor supply, but they are not sufficient in number to meet the needs of the industry. For this reason migratory workers are employed during the harvest season. The bulk of this outside labor is employed in September and October when the large student labor force must return to school. The number of hired seasonal workers is shown in Figure 14. A breakdown of the type of employee is shown in Figure 15. A problem of employing migratory laborers is that much of their wages leaves the area, and in the case of the Mexican Nationals, the money leaves the United States. The Oregon State Employment Service is initiating a program in the local high schools to inform the students of the opportunities available in the industry. From this program they hope to acquire additional student labor during the off-school periods (25).
### FIGURE 14

**NUMBER OF HIRED SEASONAL WORKERS IN THE PEAR INDUSTRY**

1956-1961

<table>
<thead>
<tr>
<th>YEAR</th>
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Source: Oregon Post - Season Farm Labor Report  
NA - not available
### FIGURE 15

NUMBER OF HIRED SEASONAL WORKERS IN PEAR INDUSTRY IN MEDFORD AREA BY TYPE OF WORKER
1957-1961

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TYPE</th>
<th>15 May</th>
<th>15 Jun</th>
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<th>15 Aug</th>
<th>15 Sep</th>
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</tr>
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</table>

Source: Oregon Post - Season Farm Labor Report
Example of an Orchard Operation: The Hillcrest Orchard was studied in detail to familiarize the author with the varied aspects of field production and the pear economy. The findings are presented here in the interest of giving the reader similar values. It is not suggested that the example studied is typical. It is larger than average and is under more intensive management than usual. Nevertheless the practices and procedures followed are common to essentially all orchards.

Hillcrest Orchard is located immediately east of the city of Medford. The orchard is planted on the gentle slopes of the foothills on this eastern side of the Medford Basin. The location of the orchard results in two distinct advantages. First, the orchard benefits from excellent air drainage. Secondly, the hillside location of the orchard approaches the tolerance level for pears in this region, and it is well known that fruit or crops do best near the limits of cold tolerance.

The total area of Hillcrest is 250 acres, including 240 acres in bearing orchard. The remaining ten acres contain pasture and the buildings and houses. The orchard layout is shown in Figure 16; seventeen blocks are indicated with acreages and pear varieties.

The average annual production of the orchard is between 80,000 and 100,000 48 pound lugs. Production in 1962 was 96,000 lugs. Production would have been higher for that year but another 10,000 lugs were lost in the wind storm that occurred in early October (26).

Hillcrest has a contract with Pinnacle Packing Company and all of its fruit is put into pools according to variety. After the fruit has been sold the receipts, less packing, storing, and other handling costs, are divided among participating growers according to their
### Layout of Hillcrest Orchard

**Scale:** 1 inch = 600 feet

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<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<td>1</td>
<td>9 acres Bosc</td>
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<tr>
<td>2</td>
<td>35 acres Comice</td>
</tr>
<tr>
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<td>4</td>
<td>1/2 acres Comice</td>
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<td>5</td>
<td>3 acres Bartlett</td>
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<td>6</td>
<td>10 acres Bartlett</td>
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<td>7</td>
<td>7 acres Anjou</td>
</tr>
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<td>8</td>
<td>22 acres Bosc</td>
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<tr>
<td>9</td>
<td>20 acres Comice</td>
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<td>10</td>
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<td>13</td>
<td>10 acres Comice</td>
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<td>14</td>
<td>7 acres Bosc</td>
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<td>3 acres Bartlett</td>
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<td>17</td>
<td>12 acres Bosc</td>
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<td>18</td>
<td>35 acres Anjou and Bartlett</td>
</tr>
<tr>
<td>19</td>
<td>Land Owned by Dunbar Carpenter</td>
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</table>

---

The orchard layout includes various sections with different varieties of apple trees, each with its respective acreage. The diagram provides a visual representation of the land distribution and the scale for reference.
contribution (26).

Hillcrest employs eight men on an annual basis, including a supervisor. Four employees live on the orchard property. Two additional men are hired to supplement this basic crew during harvest and three additional men are hired for pruning. An average of 30 pickers are hired for harvest. Half of these are Mexican Nationals who are hired in September when the student labor returns to school. The Mexican labor is obtained through the Fruit Growers League, which is responsible for supervision and housing. Thus, during the average year the total employment, full and part time, will be approximately 40 persons.

There are several cultural practices that an orchardist must perform in order to assure a good crop year after year. A typical pear growers schedule is presented in Figure 17. The Hillcrest schedule is typical.

The first cultural practice that begins after the harvest season is the pruning of the orchard. At Hillcrest pruning begins two weeks after the harvest season ends. This allows the men hired on an annual basis to take a two week vacation. All seven of the permanent help are employed in the pruning operation. They are supplemented by three additional men hired specifically as pruners. One Girette, a hydraulic pruning lift, is used in the pruning operation. This machine requires one operator and can prune approximately 55 trees per day. A picture of this machine in operation can be seen in Figure 18. All the remaining men prune manually. These men average between 25 and 35 trees per day. They are paid by the hour rather than by the
### PEAR GROWERS SCHEDULE

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<td></td>
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</tr>
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</table>

Based upon information supplied by C. B. Cordy, Jackson County Extension Agent
Figure 18

A Girette hydraulic pruner
Author's photograph
tree which helps to insure that a good job is performed on each tree. Pruning continues through the winter into early April (26).

Spring frost is of major concern to Medford District growers. Yet it was not until fairly recently that Hillcrest began frost control on a large scale. Hillcrest began orchard heating in 1961. In that year there were six nights that orchard heating was required. In 1962 there were four nights when heating was required. Prior to 1961 two wind machines were the only frost controls employed. Figure 19 is a photograph of one of these machines. The two machines are located in frost pockets that exist in the orchard. These machines raise the temperature three degrees in a 15 acre area surrounding each (26). The heating system initiated in 1961 is the Pres-To-Log method. Basically the method consists of placing four Pres-To-Logs in five-gallon cans that have been prepared for use as burners. (See figure 20.) The burners are spaced in the orchard near every other tree in every other row. Around the border of the area to be heated the burners are placed by every tree. At Hillcrest only 70 acres are presently heated. The rest of the area is on sloping land and has no serious frost problem. Burners are also placed around the base of one of the wind machines and the combination of the two frost control methods raises the temperature in the affected area between four and five degrees. The orchard is readied for frost protection in March. On nights when heating is required 17 men are hired to assist.

The spraying season for Hillcrest begins around the first of March. Five different sprays are applied to combat disease and insects. The Dormant spray, the first, is used to control scale. To control Pear
A wind machine used for mixing the air in the orchard.
Author's photograph
A Pres-To-Log heater. The two heaters on the left have a protecting cover on them. Author's photograph
Blight and Pear Scab the orchard receives a cover of Bloom spray before bloom has occurred. After bloom has taken place, Calyx spray, for mites, is applied. Three cover sprays are applied to the orchard to combat Codling Moth and Pear Psylla. The first cover spray is applied in May; the second in June; and the third in July. The last spray applied is a hormone spray. It is used to prevent droppage and is put on just before harvest. Three air-blast sprayers are used to apply these solutions. (See figure 21.) Four men are used in the operation. Three are drivers and the other mixes the solutions. In some years when the ground is too wet, Hillcrest has employed a spray plane to apply the protective solutions. This is more expensive but the protection gained is better than no protection (26).

Discing is another cultural practice performed in the spring. There are two purposes for discing the orchard. In the first place it removes and prevents weed growth. Weeds remove water and nutrients from the soil. Secondly, discing turns under the natural cover of grasses and exposes the soil allowing the heat absorbed during the day to escape and contribute in warming the air in the orchard at night. It has been determined that an orchard bare of cover crop is one degree warmer (4). The Hillcrest Orchards are disced three times; before the first irrigation, after the first irrigation; and one week before harvest to clear the orchard for the pickers (26).

Due to the lack of adequate precipitation in the area during the spring and summer months, all orchards in the valley must be irrigated. The irrigation season for Hillcrest begins around the first of June. It takes three weeks to irrigate the entire orchard. There is then a layoff
Figure 21

An air-blast sprayer applying a blight control spray. Author's photograph
for one week, before the cycle is repeated. All varieties in the orchard receive three irrigations. The winter varieties receive an additional coverage. Hillcrest uses the furrow method of irrigation. Tile pipes are laid underground with outlet valves located at the end of the rows. The water is released from these valves and flows through the orchard rows in the furrows. All the water is pumped, except for 30 acres. The pumps are run 24 hours per day during the irrigation season. Six men operate the system during the day. One man tends the operation at night.

Many growers in the district thin their fruit quite heavily. Very little thinning, however, is done in Hillcrest. If there is a slack period in other orchard routine then some thinning will be done to keep the men employed. Hillcrest management does not feel that the results of thinning warrant the added expense required (26).

The peak of the season is during harvest. This is the time of maximum employment and activity. The harvest season in this district and consequently at Hillcrest begins around the tenth of August. The first pears picked at the Bartletts. These are followed by the D'Anjou. If the Comice are ready after the D'Anjou's then they will be picked. If not then the pickers will start on the Bosc and then as soon as the Comice have reached picking stage they will change over and begin on the Comice. The Comice are picked as soon as possible due to their greater value and the fact that they are more susceptible to wind damage. Some years two crews will be employed to pick the Comice and the Bosc simultaneously. Pickers are paid by the lug at rates between
16 and 23 cents depending upon the variety.

There are 30 pickers employed during the harvest season. They use the standard ladder and pear bucket. (See figure 22.) After being picked the pears are emptied into the lugs. The lugs are then placed on pallets which in turn are loaded on trucks by a tractor equipped with lift forks. The pallets are transported to Pinnacle Packing Company where the pears are prepared for marketing.

Hillcrest Orchard has few problems. The only serious problem existing at present is the presence of some Pear Decline in the orchard. This menace is being combatted by removing or by heavy pruning the infected tree.

**Packing and Processing Facilities**

The second major phase of the industry begins when the pears are received at the packing house or cannery. At the present time there are 12 packers and two canneries operating in the county. The names, location, and the estimated number of employees is presented below.

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<th>Location</th>
<th>Number of Employees</th>
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<td>Medford</td>
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<tr>
<td>Bagley Canning Co.*</td>
<td>Ashland</td>
<td>100+</td>
</tr>
<tr>
<td>Barnes Bros.</td>
<td>Talent</td>
<td>50-100</td>
</tr>
<tr>
<td>Dunbar Orchard</td>
<td>Medford</td>
<td>50-100</td>
</tr>
<tr>
<td>Harry &amp; David</td>
<td>Medford</td>
<td>1000+</td>
</tr>
<tr>
<td>Modoc Orchard</td>
<td>Medford</td>
<td>100+</td>
</tr>
</tbody>
</table>
A picker using the standard picking recepticle. The fruit is emptied into the lug by releasing the cords on the side of the bucket.

Author's photograph
Production: These packers and canners prepare and market essentially all of the pears grown annually. The figures given below show production and estimated market value for selected years (18).

<table>
<thead>
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<th>Year</th>
<th>Production</th>
<th>Estimated Value</th>
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<td>2,850,000 boxes</td>
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<td>1956</td>
<td>3,490,000</td>
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<tr>
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</tr>
<tr>
<td>1945</td>
<td>2,151,977</td>
<td>$7,900,000.00</td>
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</table>

A graphic representation of pear production in the Medford District is presented in Figure 23.

Fruit Processing: The steps and procedures for preparing and processing pears are fairly uniform for all packing houses. The fruit, unloaded on the receiving platform, is labeled with a receiving ticket that includes the growers name, the date received, and the variety.
Figure 23

ROGUE VALLEY PEAR PRODUCTION

Very Heavy Crop

DDT

Freeze

Freeze

Source: C.B. Cordy
Depending on the variety the pears are either packed within a day or sent into cold storage to be packed later. In most houses each grower's fruit is graded, sorted, and packed separately (32). For this reason the packer may wait a day or so to run a grower's fruit in order to run a large volume at one time. When a changeover is made in the house the fruit in the bins is estimated and the number of boxes is credited to the grower. At this time the lot number and marking stamp also are changed to coincide with that on the receiving ticket. The fruit is graded, washed, and sorted to grade. It is then packed and tallied. The packed boxes are sent to cold storage according to variety. In most instances all the fruit received by the packer is placed in a pool according to variety, size, and grade. These pools are drawn upon as markets are obtained. The receipts are divided among the growers according to the percentage of contribution (32).

The two canneries in the county processed approximately 8,500 tons of Bartletts in 1962 (20). The Bartlett is the only variety canned. Thirty percent of the local crop of Bartletts is sold to the two canneries. Approximately 3,000 tons of Bartletts are sold to canneries located in other areas. In 1962 the cannery price for Bartletts was $60.00 per ton. The processing procedure in a typical cannery is as follows: Upon receipt at the cannery the fruit is immediately placed in cold storage for a period of five days. After this cooling-off period the pears are removed from storage and placed in a ripening room for a similar length of time. The temperature and humidity are controlled in this room to assure uniform ripening. When the fruit has reached
the proper maturity it is graded and sent over an inspection belt for sorting by neck size. There are several grades for each of two categories, long and short neck. The pears are then peeled by several automatic peelers that can prepare 66 pears per minute. After peeling, the fruit is hand inspected for any necessary trimming. The fruit is then placed in the cans, syrup is added, and the cans vacuum sealed. The cans are placed in a cooker for a period of 14 to 20 minutes, depending on the development of the fruit. The temperature is maintained at 260 degrees F. during this time. After the cooking process the cans are cooled to 90 degrees F. and placed in storage. As the fruit is sold it is labeled and boxed to meet the buyers specifications.

The total value impact of the pear industry in 1961 amounted to $15,000,000. Two-thirds of this total represents the farm market value of the fruit. The other third includes the wages and salaries of those employed in the industry plus the wages of those employed in allied industries such as transportation, cold storage, and fruit inspection (35).
CHAPTER SIX

CULTURAL PRACTICES

The purpose of this chapter is to analyze in more detail the many cultural practices that the pear grower must perform each year in order to be assured of a profitable crop.

Planting

Many of the trees in the county are over 50 years old. Replacement of these older trees has been in progress for a number of years. Due to the ravages of Pear Blight and Pear Decline the grower must take care in selecting new stock to replace these aging trees. The Southern Oregon Branch Experiment Station has conducted extensive research with many varieties in order to obtain the ideal root and trunk stock (39, p.18: 11). Onto a resistant root-stock a blight resistant variety, usually Old Home, has been grafted to form the trunk and framework (11, p.59). The grower then grafts onto this framework the variety he plans to grow for commercial production. Much of the nursery stock for this area is obtained in Portland or California (13: 28).

Preparation for planting is now done mechanically. A common method is to use a tractor equipped with a post-hole digger to prepare the site for the tree. A photograph of a recently prepared area on the valley floor is shown in Figure 24. The new trees are placed in the hole at the same depth at which they were planted in the nursery (14, p.101). Young trees are not placed in a hole in which water is likely to accumulate. Prolonged exposure to excess water deprives the roots
An area on the valley floor that has been prepared for the planting of a new orchard.
Author's photograph
of oxygen and they eventually die (27). This condition is referred to as "wet feet". If the land is above average in suitability for growing pears then the new trees will not require extensive fertilization (14, p.102).

The trees are spaced between 20 and 25 feet apart. Care is taken in aligning the rows in order to assure that the orchard can be worked with ease. During early years cultivation is extensive and protection against disease and insects are common practices. Any diseased trees are removed from the orchard. With proper care and under favorable conditions the young trees will bear a crop in seven to ten years depending on the variety (4). A picture of a young orchard is shown in Figure 25.

**Pruning**

Effective pruning is a practice that all growers must perform in the management of the orchard. There are seven reasons why pruning is necessary (26). These are;

1. Cut out the old wood.
2. Open the center of the tree to the sun.
3. Open the center of the tree for effective spraying.
4. Hold the height of the tree down.
5. Keep the tree in balance.
6. Keep the tree, especially the fruit wood, growing vigorously.
7. Provide ladder space for the pickers.

The pruning season is from October through March. Pruning practices differ depending on whether the tree is bearing or non-bearing.
A non-bearing orchard planted on the valley floor.
Author's photograph
Pruning Young Trees: The fundamental purpose of pruning young or nonbearing trees is to develop a suitable framework to assure maximum fruit production in the future (34, p.1). Young trees are not heavily pruned for this only delays the beginning of fruit production. When a young tree is removed from the nursery much of the root system will be lost. To compensate for this loss the top of the young tree is pruned upon planting (14, p.103; 34, p.1).

When pruning at the end of the first year, four or five vigorous branches six to 12 inches apart along the trunk and well distributed around it should be selected for the main scaffold branches (39, p.19). The excess limbs are removed. It is preferable that the central branches be somewhat stronger than the lower branches, as they form the leaders of the tree, and stronger crotches result if the side branches are smaller than the trunk from which they rise (39, p.19). After the main branches have been selected they are not pruned until the tree has reached the bearing stage (4, p.1). Any excess branches may be removed at any time.

After the third year any pruning will delay the start of fruit production. Undesirable branches and limbs that develop after the third year can be removed after the tree has begun bearing fruit (34, p.1).

Pruning Bearing Trees: After the tree begins to produce fruit the objective of pruning changes. The emphasis now is to keep the tree healthy and bearing substantial yields and to prepare the tree for spraying and picking (34, p.1). To assure profitable crops each year the fruiting spurs should be kept vigorous. These spurs continue to produce fruit up to ten years (39, p.20). After this
time their productiveness diminishes. Growers should remove about ten percent of the productive spurs each year to allow new spurs to develop.

Once the trees reach bearing age then annual pruning is kept at a moderate rate. Extensive pruning will cause the tree to become more susceptible to blight (39, p.20). Pruning alone is not the answer to producing quality fruit, it's one of the requirements that must be integrated into a sound management program.

Manual pruning is the common practice in the county. (See figure 26.) The pruners are either paid by the hour or by the tree. The majority of the growers pay their pruners by the tree. Paying by the hour is more advantageous in that it assures that each tree will be pruned properly and less supervision is required, but the cost per tree is higher. On the average one man will prune 30 trees per day. There are a few Girette mechanical pruners in the county. These machines are manufactured in Canada and cost around two thousand dollars (26). One man is used to operate this machine and he can prune around 55 trees per day. This machine also can be used for picking or thinning fruit. There is some difficulty, however, in using these machines when the orchards are very wet.

**Thinning**

There are some pear varieties that bear very heavy crops. The grower must thin out some of the clusters in order that the fruit can attain desirable size and quality. Natural pear drop occurs about six
A man using the standard pruning tools on a Bosc tree.
Author's photograph
weeks after bloom (39, p.21). Thinning should be done as soon after this date as possible. Experiments have indicated that for nearly all pears grown 30 or 40 leaves per fruit are essential for the building of the materials for desirable fruit development (39, p.21). After the natural drop there still may be between three and five pears per cluster, but if the crop on the tree as a whole is not excessive no thinning is necessary.

Irrigation

Due to the definite summer drought existing in the Medford Pear District, irrigation is necessary. The irrigation season begins in early June and extends through the harvest season. The supply of irrigation water is somewhat limited in this area. Thus the grower is faced with using the available water effectively to provide the greatest yields and at the same time hold down operating costs.

There are three irrigation districts from which the growers obtain water. These are the Talent, Medford, and Rogue River Valley irrigation districts.

The water supply for the Talent Irrigation District comes from the flood flow of the South Fork of Little Butte Creek and its tributaries; Keene Creek above Hyatt Prairie and Keene Creek dams; Emigrant Creek and tributaries above Emigrant Dam; and the Howard Prairie Reservoir (45, p.74).

The water supply for the Medford and Rogue River Valley Irrigation Districts is obtained from the direct flow from and North and South Forks
of Little Butte Creek supplemented by storage in Fourmile Lake Reservoir in the Klamath River Basin Watershed and Fish Lake Reservoir (45, p. 74).

Some orchardists obtain their water from partnership or individual irrigation projects as the result of early water rights on local streams.

There are three main methods by which the water is applied to the orchards in this area. The first is the rill or furrow method. Approximately 50 percent of the irrigation in the valley is applied by this system (4). Four or five furrows are equally spaced between each tree row. Water from a head-ditch or pipeline is allowed to flow down the furrows. The problems with this method are twofold. First, there is an area of dry soil in each tree row, especially around the base of each tree. Secondly, it is difficult to apply a uniform amount of water along the length of the furrow (39, p. 17).

The second method used is flooding the orchard. Thirty percent of the irrigation water is applied in this manner (4). This method is somewhat inefficient since there is less control over the water. Also, much water is wasted in this operation.

Sprinkler irrigation is the last method used by the growers in this area. Twenty percent of the water is applied by this procedure. Sprinklers are often used on the steeper land. Using sprinklers assures that all of the soil will be watered. The system, however, is not without problems. Costs are usually high, spray materials may be washed from trees, and the rise of humidity in the orchard may be damaging.

Most of the mature trees require between five and six acre-inches of water in the dry months of July and August. Since some of this
water is lost to evaporation, about seven inches per month is not excessive (39, p.18).

**Weed Control**

The presence of extensive weeds in an orchard is a problem with which each grower must cope. Weeds rob the trees of nutrients and water. Weeds can be controlled by cultural practices or by chemicals.

Mechanical control such as mowing or discing is the most common practice. These practices leave many weeds around the base of each tree. Mulches are also used to control the annual weeds. Mulches, however, have not been proved effective in controlling the perennial weeds (7, p.1). The use of a mulch may provide cover for rodents that may injure the tree or its root system.

There are several chemicals that can be used in the orchard to control weed growth. A summary of the use of other chemicals can be found in a recent Fact Sheet (7).

**Fertilization**

Extensive studies have been conducted in this area to show the effectiveness of the use of fertilizers to increase the yield per acre (2). The only type of fertilizer recommended for use here is nitrogen (4). Positive results have not been obtained by the use of any other. The specific type of nitrogen fertilizer used depends on the price. In 1963 the price of ammonium sulfate was very low so this type was widely used. Other fertilizers used are ammonium nitrate, Urea, and
calcium nitrate (4). The fertilizers are applied in the early spring, at or before the start of bud activity.

Harvesting

In the Medford Pear District the harvesting begins around the 10th of August. The first variety picked is the Bartlett. About 40 percent of the Bartlett crop is sold to the two local and other canneries. The remainder of the crop is sold as fresh fruit. D'Anjous follow the Bartletts. It is one of the most important winter pears, and all of the Anjou crop is marketed as fresh fruit. The third of the four major varieties picked is the Comice. This pear requires careful handling. A large percentage of the Comice crop is used in the fruit gift box industry. Some of the growers will pay the pickers by the hour when picking Comice. This helps to insure that the pears will be handled carefully. The last variety picked is the Bosc. This is an early winter pear and is marketed as fresh fruit. Harvesting in the Medford Pear District usually terminates around the middle of October.

The method of picking is uniform throughout the orchards. The growers supply the pickers with a ladder and a recepticle in which to place the pears. (See figure 22.) Since the Bartletts are picked by size, the orchards must be covered at least twice in the harvest process. At the first of the season many of the growers require the pickers to "ring" the pears of questionable size to determine if they have reached the desired size for picking. When ringing is required the grower will pay the picker a higher price per lug. Later in the season the pickers
will strip all fruit from the Bartlett trees. All other varieties are picked but once. The picker empties his fruit into 48 pound lugs. Each lug is tallied and credited to the picker. The lugs are placed on trucks either by hand or fork lifts and then transported to the cannery or packing house.
CHAPTER SEVEN
USES, MARKETS AND PRICES

Uses

At the present time there are three major uses of the pears harvested in Jackson County. These are fresh fruit pack, cannery use, and gift box pack. By far the most important is the fresh fruit pack. Of the 2.9 million 48 pound boxes harvested in 1961 approximately 2,440,000 were marketed as fresh fruit. The cannery total for this same period was approximately 450,000 48 pound boxes. (See figure 13.) The remainder over 100,000 boxes were used in the gift box industry. Over a million fruit gift boxes of various sizes were marketed in 1962 (11). Due to the rigorous grading rules adhered to by the packers there are approximately 5,000 tons of pears each year that are classified as culls (4). At present there is no commercial use made of the culls. The growers cooperating with the local extension agent and Oregon State University are conducting research in order to find a commercial use for the cull fruit. At the same time new uses for the acceptable grades are being investigated. One of the most promising uses is preparing pear drinks, either as pure pear juice or as a carbonated beverage.

Markets

The pears grown in the county are consumed throughout the United States and in many foreign countries. The bulk of the annual production is consumed by the domestic market. The individual packer has
three methods of marketing his fruit. He can sell his fruit directly to the buyer. He can deal through a broker, or he can place his fruit in one of the eastern auctions. The first method is the one employed by the majority of the packers. The buyers, such as large chain grocery stores, have personnel in the district that do the buying. Selling direct to the buyer eliminates the middle man thereby maximizing the return (35).

The fruit is transported to market by rail and by truck. Shipment by refrigerated boxcar is the main mode of transportation. Figure 27 shows a worker loading the standard fresh fruit pack into one of these refrigerated cars. All the fruit that is to be exported is shipped by truck to Portland, Oregon (35). This takes one day compared to three if shipped by rail. The carlot shipment of pears from Jackson County for the past ten years is presented in Figure 28.

There are three reasons why it is difficult to determine the final destination of the fruit that leaves this area. In the first place it is a common practice to ship carlots of fruit that have yet to be sold. The packers or their brokers will make a transaction while the fruit is in transit. Secondly, cars shipped unsold are often unloaded at a point in transit and placed in cold storage and later sold (35). Lastly, many of the growers do the selling themselves and their records are not available. For these reasons the destinations and number of carlot unloads presented in Figure 29 are concerned with pear shipments from Oregon and not just the Medford Pear District. The small number of unloads delivered at Los Angeles can be explained by the fact that
Loading the standard fresh fruit pack into a refrigerated boxcar.
Author's photograph
### Figure 28.

**CARLOT SHIPMENTS OF PEARS FROM JACKSON COUNTY, OREGON**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
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<td>509</td>
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<td>503</td>
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<td>392</td>
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<td>303</td>
<td>156</td>
<td>62</td>
<td>23</td>
<td>1</td>
<td>3778</td>
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<tr>
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<td>37</td>
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<td>751</td>
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<td>271</td>
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<td>52</td>
<td>931</td>
<td>918</td>
<td>334</td>
<td>471</td>
<td>268</td>
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<td>293</td>
<td>265</td>
<td>73</td>
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<td>311</td>
<td>146</td>
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<td>180</td>
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<td>171</td>
<td>93</td>
<td>26</td>
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<td>347</td>
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<td>297</td>
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<td>536</td>
<td>541</td>
<td>262</td>
<td>506</td>
<td>338</td>
<td>251</td>
<td>300</td>
<td>280</td>
<td>156</td>
<td>9</td>
<td>3333</td>
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<tr>
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<td>232</td>
<td>647</td>
<td>489</td>
<td>507</td>
<td>313</td>
<td>275</td>
<td>206</td>
<td>124</td>
<td>57</td>
<td>13</td>
<td>2962</td>
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<tr>
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<td>373</td>
<td>333</td>
<td>200</td>
<td>377</td>
<td>237</td>
<td>234</td>
<td>158</td>
<td>82</td>
<td>18</td>
<td>0</td>
<td>2038</td>
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<tr>
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<td>390</td>
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<td>183</td>
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### RAIL CARLOT UNLOADS OF OREGON PEARS IN SELECTED UNITED STATES AND CANADIAN CITIES

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<th>1960</th>
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</thead>
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<tr>
<td>Atlanta, Ga.</td>
<td>44</td>
<td>32</td>
<td>13</td>
</tr>
<tr>
<td>Baltimore, Md.</td>
<td>45</td>
<td>56</td>
<td>26</td>
</tr>
<tr>
<td>Boston, Mass.</td>
<td>202</td>
<td>247</td>
<td>163</td>
</tr>
<tr>
<td>Chicago, Ill.</td>
<td>283</td>
<td>276</td>
<td>207</td>
</tr>
<tr>
<td>Cleveland, O.</td>
<td>67</td>
<td>95</td>
<td>50</td>
</tr>
<tr>
<td>Dallas, Tex.</td>
<td>12</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Detroit, Mich.</td>
<td>81</td>
<td>77</td>
<td>46</td>
</tr>
<tr>
<td>Kansas City, Mo.</td>
<td>10</td>
<td>5</td>
<td>---</td>
</tr>
<tr>
<td>Los Angeles, Cal.</td>
<td>9</td>
<td>12</td>
<td>4</td>
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<tr>
<td>Miami, Fla.</td>
<td>88</td>
<td>69</td>
<td>88</td>
</tr>
<tr>
<td>New Orleans, La.</td>
<td>54</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Newark-New York</td>
<td>1156</td>
<td>905</td>
<td>822</td>
</tr>
<tr>
<td>Philadelphia, Pa.</td>
<td>222</td>
<td>202</td>
<td>128</td>
</tr>
<tr>
<td>Providence, R. I.</td>
<td>54</td>
<td>26</td>
<td>27</td>
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<tr>
<td>St. Louis, Mo.</td>
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<td>27</td>
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<tr>
<td>Washington, D.C.</td>
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<td>44</td>
<td>41</td>
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<tr>
<td>Montreal, Quebec</td>
<td>100</td>
<td>61</td>
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</tr>
<tr>
<td>Ottawa, Ontario</td>
<td>8</td>
<td>16</td>
<td>NA</td>
</tr>
<tr>
<td>Toronto, Ontario</td>
<td>53</td>
<td>70</td>
<td>NA</td>
</tr>
<tr>
<td>Winnipeg, Manitoba</td>
<td>3</td>
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<td>NA</td>
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NA Not available.
most of the shipments to this and other Pacific Coast cities are transported by truck. In 1960 there were 271 carlot equivalent unloads delivered to Los Angeles (38).

Due to the fact that a large percentage of the pears grown in the county are winter pears they must be kept in cold storage for various lengths of time after harvesting. There has been considerable research done on the cold storage operations here (12). Each particular variety has a definite limit as to how long it can be kept in cold storage. The leading varieties of the area, when picked at the proper time and when subjected immediately to cold storage, can be held for at least the following periods of time; Bartlett from 40 to 50 days; Bosc, Comice, and Seckel from 90 to 100 days; Anjou from 150 to 180 days (12, p.10). If kept longer than the prescribed time the pears will fail to ripen after taken out of storage. If the cold storage conditions are not adequately maintained the pears will become infected with one of the many storage diseases.

Pears placed in cold storage are unlike apples in that the colder the temperature that can be maintained the longer the storage life of the fruit (4). Thirty degrees F. is the temperature level maintained in most of the storage buildings. At this temperature a few of the boxes on the floor or near the air inlets will freeze, but if the freezing is not extreme the quality of the fruit will not be affected. For the most part, the cold storage buildings in the county are constructed of concrete. Wooden buildings have not proved effective and the cost of steel buildings is prohibitive.
In some of the other pear and apple districts in the United States the carbon-dioxide cold storage method is used to preserve the fruit. This method has not been used in the Medford area. A simple explanation of this method would be as follows: pears "breathe" in the same manner as humans. They take in oxygen and give off carbon-dioxide. Concentrated amounts of carbon-dioxide are the cause of some storage disorders. The air from the storage area is removed and "scrubbed" to remove the carbon-dioxide. The air is then pumped back into the storage area but the oxygen content has been reduced hence the amount of carbon-dioxide will be diminished. The cycle is continuously repeated. This process depresses storage rot and reduces scald (4). The market life of the pears is extended. D'Anjous can be kept in storage an additional three months. It has been estimated that this process increases the cost per box by fifteen cents (4). Cost has been the limiting factor for use of this process in the county. All of the existing storage buildings would have to be remodeled into buildings that could not "breathe" by being perfectly sealed. A controlled atmosphere storage building is usually constructed of steel with specially sealed doors and other openings.

To insure that the fruit shipped is in good condition after it has been removed from cold storage, Federal-State inspection agents are located in Medford. These agents conduct random inspections of the fruit while it is being placed in the cars. The individual packers pay the State for conducting these inspections.
Prices

It was mentioned earlier in this study that the quality of the fruit produced in Jackson County commanded some of the highest prices on the market. The prices given in Figure 30 illustrate this point. Owing to the fact that all of the packers conduct their own selling, prices for local fruit can only be obtained from auction reports. An F.O.B. price at Medford can be roughly determined by subtracting $1.25, the price of transportation to New York, from the auction prices as shown in Figure 31.
FIGURE 30

PRODUCTION IN 1000 BUSHELS & SEASON AVERAGE PRICE, ALL SALES
1957-1960

<table>
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<tr>
<th></th>
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<th></th>
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<tr>
<td>OREGON</td>
<td>5,910</td>
<td>1.81</td>
<td>5,060</td>
<td>1.72</td>
<td>5,110</td>
<td>2.06</td>
<td>4,500</td>
<td>2.42</td>
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<tr>
<td>WASHINGTON</td>
<td>4,720</td>
<td>1.42</td>
<td>4,700</td>
<td>1.86</td>
<td>4,080</td>
<td>1.91</td>
<td>3,130</td>
<td>2.49</td>
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<tr>
<td>CALIFORNIA</td>
<td>17,418</td>
<td>1.56</td>
<td>14,459</td>
<td>2.03</td>
<td>16,876</td>
<td>1.61</td>
<td>15,126</td>
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<tr>
<td>MICHIGAN</td>
<td>780</td>
<td>1.65</td>
<td>1,500</td>
<td>1.60</td>
<td>1,400</td>
<td>1.65</td>
<td>1,250</td>
<td>1.80</td>
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</table>

* Washington and Oregon prices shown are equivalent packing house door returns. California prices are equivalent returns for bulk fruit at first delivery point.

SEASON WEIGHTED AVERAGE PRICE IN EIGHT AUCTIONS, THREE IMPORTANT VARIETIES GROWN IN WASHINGTON AND OREGON DURING 1960 SEASON

<table>
<thead>
<tr>
<th>STATE</th>
<th>ANJOU Bx.</th>
<th>ANJOU Pr.</th>
<th>BARTLETT Bx.</th>
<th>BARTLETT Pr.</th>
<th>BOSC Bx.</th>
<th>BOSC Pr.</th>
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</thead>
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<td>$4.62</td>
<td>13,096</td>
<td>$4.05</td>
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Source: U. S. D. A. Agricultural Marketing Service, Marketing Northwestern Pears, 1960
**Figure 31**

Average Prices of Medford Pears on the New York Auction
(Selected Dates)

<table>
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<td>R. Bartlett</td>
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CHAPTER EIGHT

PROBLEMS OF THE INDUSTRY

Even though this county is one of the leading pear producing regions in the United States it is not without its problems. There are several diseases and insects that are a menace to the fruit produced here. The climate while generally favorable presents some problems to the grower. It is the purpose of this chapter to take a closer look at these and other problems of the industry.

Diseases and Insects

Pear Decline: Decline is a relatively new disease, first appearing in the Pacific Northwest in 1948 (42, p. 1). It was first discovered in British Columbia and gradually moved south. Trees infected with decline lose their vigor, become unproductive, and eventually die. This may occur gradually (slow decline) or it may occur during the summer season (fast decline).

At present the cause of decline is an unsettled question. It is known that decline is not caused by a bacterium or a fungus (28). Such factors as soil organisms, soil moisture, fertilizer practice, pesticide sprays, and winter injury are not a cause of this disease (43, p. 1). Two other theories have been advanced as to the cause of decline. One states that decline is caused by a virus. The other states that decline is caused by a toxin injected into the tree by the Pear Psylla. It is the former theory that is now more widely accepted. To determine
if a tree has decline an examination of the bark tissue taken in cross section at the bud union must be made. A affected tree will show a degeneration of living bark tissue near this bud union (43, p. 1). Some infected trees will show a distinct brown line at the union, while others will not. The presence of a brown line is considered conclusive evidence that the tree had decline (4). However, all trees with decline do not show the brown line.

Since it is now widely believed that the Pear psylla transports the virus that causes decline, the growers must maintain psylla control throughout the year. Because decline affects the rootstock tissue the grower can propagate on rootstock that is immune to decline. Trees grafted on *Pyrus betulafolia*, oriental, have been little affected by decline in Jackson County (4). Trees grafted on *Pyrus serotina*, Japanese, and *Pyrus ussuriensis*, Chinese, are the most susceptible to decline. Trees grafted onto Old Home are resistant to this malady. A tree infected with decline is shown in Figure 32.

**Pear Blight:** Blight, *Erwinia amylovora*, is a malignant bacterial disease caused by *Bacillus amylovorus* (14, p. 112). The disease causes the blossoms to wilt, and after the petals fall, fruit and spur will show the characteristic blackening (14, p. 111). If the roots are affected blight can be identified by the deep purple color that appears.

Blight has long been the dread disease of the pear. Blight first appeared in Jackson County in 1906 (28). Bichloride of mercury was used to combat the disease but it proved to be ineffective. The ravages of pear blight became so severe that in 1923 a group of growers
The tree on the left has been infected with Pear Decline. The tree on the right is a healthy, bearing specimen. C. B. Cordy photograph
came to the Southern Oregon Branch Experiment Station and stated that unless they had a method of combatting the disease that they would lose their orchards. The station had been conducting research using Bordeaux, a copper, sulfate-lime spray, to control blight. The results of this research had not been proved conclusively, but out of necessity the growers were allowed to use the bordeaux solution (28). The spray proved to be effective. The control of blight was one of the many contributions that the local Experiment Station made to the pear industry.

Blight is still present in the valley, but growers now combat it by spraying with weak neutral copper or streptomycin sprays, and using blight resistant trunk stock.

**Pear Scab:** Scab, *Venturia pyrina*, is caused by a fungus (14, p.114). Scab appears here because the valley receives considerable spring rainfall. This disease destroys the value of affected fruit (39, p.24). Growers control Scab by applying fungicidal sprays, such as cyprex. The use of these sprays has minimized the seriousness of the disease.

**Codling Moth:** Codling Moth, *Carpocapsa pomonella*, results in some damage. It is the larva of the moth that causes the injury to the fruit. The larva bores into the pear and destroys its commercial value (39, p.23). The most effective method of controlling this insect is to spray the trees with DDT or Guthion (28).

**Pear Psylla:** The Pear Psylla, *Psylla pyricola*, has posed a serious threat to the pear industry since it is now widely believed to be associated with the cause of Pear Decline. The psylla also secretes a sticky fluid that runs over the fruit and foliage (14, p.118). The fruit then
becomes discolored and brown spots appear on the leaves. This insect can be controlled by the application of phosphate sprays such as Guthion (4).

There is another problem that, while not caused by disease or insects, is more in this category of problems than the others that follow. This is the problem of preventing fruit drop before or during the harvest season. If not controlled it can cause considerable loss to the grower. Fruit drop can be prevented by the use of hormone sprays such as naphthalene acetic acid. If the grower uses a hormone spray he must take care to harvest the fruit at the proper time and not allow the pears to remain on the tree too long. Overripe pears tend to break down rapidly after harvesting.

The diseases and insects are a constant concern of the growers. They must be controlled in the interests of quality fruit production as well as maintaining tree vigor. Control is a distinct cost factor in considering profitability of pear production.

Frost

One of the serious limitations imposed by the climate is the occurrence of below freezing temperatures during the spring months. March through early May is the frost danger season. During this period temperatures below critical levels can kill open pear blossoms and injure newly formed fruit. Frost control is not an easy task for the pear grower. A serious frost can mark the fruit to an extent that it has no commercial value. Frost-rings, brown, somewhat hardened areas, appear on the fruit making it unattractive as well as affecting its
eating quality. These rings as they appear on immature and mature fruit are shown in Figures 33 and 34.

Tolerance of low temperatures varies with the varieties and stages of development. The grower must constantly check his orchard to determine what stage of development the majority of his trees have attained. A recent publication by the Jackson County Extension Service provides an excellent guide to orchard heating, the popular method of frost control practiced in the valley (30).

It was long thought that heating had a dual purpose. Heating the air around the tree was known to be necessary. But to be completely effective, it was thought that the fuels burned should be such that would create a heavy smoke layer above the orchards to retain the heat. For this reason materials such as wood, manure, tires, and crude oils were burned (10). Use of these materials caused an air pollution problem that was of great concern to the residents of the valley. It was discovered in later years that maintaining a heavy smoke layer over the valley had little effect on the temperature maintained below. In light of this knowledge many of the heating devices were refined. Even with the use of the more effective means of heating the "smudge" or air pollution problem still remained. In 1959 the members of the Medford Fruit Growers League took action to help reduce the pollution problem. The League set up standards that defined what type of orchard heaters would be approved for use. Once the heaters were classified as approved or unapproved a voluntary program was established to gradually eliminate the unapproved heaters. All open-flame
Frost marking on immature fruit.
C. B. Cordy photograph
Figure 34

Frost marking on mature fruit.
C. B. Cordy photograph
and sliding-lid heaters were classified as unapproved. A sliding-lid heater is shown in Figure 35. At the present time there are 112,000 approved heaters in the county. This amounts to 84 percent of the total number of heaters (29).

An approved heater that has become popular with many growers is the return-stack oil heater. This heater shown in Figure 36. The smoke from the burning oil is captured in the main stack and returned to be reburned. Also, the amount of heat given off by this heater can be regulated. The return-stack heater is manufactured in Southern California and costs approximately $7.50 (44, p.11). The heater holds nine gallons of crude oil and burns a gallon per hour when in use. The oil costs the grower about 15 cents per gallon.

There is no standard method of placing heaters in orchards. A common practice, however, is to place a heater by every tree in every other row in the area to be heated. Around the border of this area a heater is placed by every tree. When placed in this manner about 40 heaters are used on each acre heated. One-half of this number is used in some orchards where frosts are not as severe.

A new method of orchard heating now being used in the valley is Pres-To-Log heating. A Pres-To-Log is composed of eight pounds of clean, dry planer shavings which have been compressed under great pressure into a dense, cylindrical log. It measures four inches in diameter and 12 inches in length. Four of these logs are placed in a five-gallon bucket. The buckets are especially ventilated for efficient burning and used ones cost about 25 cents each (44, p.11). An
A sliding-lid orchard heater. This type of heater is unapproved for heating in the valley.
Author's photograph
A return-stack orchard heater.
This is a widely used approved heater.
Author's photograph
effective method of using the burners is to place them in groups of three approximately 25 feet apart. (See figure 37.) Each set of four logs will burn for two hours. Each log costs approximately six cents.

There are advantages and disadvantages in using the logs for orchard heating. The advantages can be summarized as follows: low initial cost outlay; low smoke output; logs are safe to use; and they produce an adequate amount of heat. For these reasons the logs have become popular with the small orchard owner and for use as a supplementary heater to other types. The disadvantages are as follows: the logs must be lighted early and take longer to reach full heat output; once the logs have been ignited there is no way to put them out; there is no control of the heat output; and more labor is required for refueling. It is for these reasons that the use of Pres-To-Logs as the only source of heat for an orchard is unadvisable.

The only other method of frost control employed in the valley is the use of wind machines. These machines are of minor importance with only four operating at the present time (10). They have most effective when combined with heating.

During the frost danger season the U. S. Weather Bureau with the cooperation of the Fruit Growers League and the Jackson County Extension Service, stations a man in Medford whose specialty is frost control. This person assists the growers with frost control and provides a nightly frost forecast.

Orchard heating or firing as it is locally described, is not necessary in all of the three spring months but there has not been a year in
Groups of Pres-To-Log heaters placed in an orchard in their protective coverings. Author's photograph
which no firing has occurred. The 11 year summary below gives the comparative figures for cold nights during the vulnerable period and nights of firing.

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Some growers will place their heaters in the orchard immediately after the harvesting ceases. Others will wait until late February to ready their orchards.

**Hail**

The occurrence of hail is another problem imposed by the climate. Although damaging hail storms do not occur in every year, when they occur serious damage to the pear crop is a common result. Hail can destroy the blossoms, young fruit, and mature fruit. The destructive capacity of hail on immature fruit can be seen in Figure 38. The immature fruit may not be destroyed by hail but the result of early hail injury will appear in the mature fruit. Figure 39 is an example of this damage.
Hail damage on immature fruit.
C. B. Cordy photograph
Figure 39

The resulting effects of hail damage on mature Bartletts. C. B. Cordy photograph
The danger period for hail, therefore, begins at bloom time in April and extends through the harvest season. The occurrence of hail as recorded at the Medford Weather Station for the last five years is presented in the data given below.

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<th>APR</th>
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Source: Medford Weather Station, Local Miscellaneous Statistics.

An extensive study of the occurrence, duration, and intensity of hail was recently completed in the county but the results of this study as yet have not been published.

The only protection the grower has against hail is to purchase hail insurance. Insurance of this type is expensive and there is often the problem of calculating the extent of the damage (26).

**Urban Encroachment on Agricultural Land**

The alienation of high quality agricultural land for other uses has not yet been a serious problem to the pear industry. The bulk of the orchards are located away from the commercial and residential districts. Housing subdivisions and new commercial uses as yet have caused the removal of little orchard area. The Land Use Committee
of the Jackson County Planning Conference has estimated that less than 1,000 acres of agricultural land has been diverted to non-agricultural use in the last 15 years (19, p.37). Of this total less than one-third of the acreage is class II or III land. The committee also estimated that there were 7,500 building lots in the urban areas that are potentially available for business expansion (19, p.37).

The urban expansion that undoubtably will occur should have little affect on the pear industry. The ideal orchard land is located away from the areas where the urban development is likely to occur. The orchard acreage has remained rather stable for the past 30 years and all indications would suggest that this will continue in the future. New plantings will be largely in existing orchards to replace aging trees.

Freeways utilize approximately 40 acres of land per mile (19, p.37). If adequate planning and consideration of long range goals are kept in mind these new highways will not encroach upon good agricultural land. The new freeway that was recently completed removed little high quality land from agricultural use. There is some consideration of formulating a county-wide zoning program to ensure that proper use will be made of the land in the county.
CHAPTER NINE

SUMMARY AND OUTLOOK

Summary

The pear industry is a profitable agricultural adjustment in the Medford Pear District. It is doubtful that any other enterprise could have been selected to bring a higher return to this small area. It is the author's conclusion that the development is the result of a complex of physical and human conditions interacting in favorable combination.

Localizing Factors: It was the physical factors existing in the Medford Basin that were mainly responsible for the industry getting its start here. The warm summers with low humidity and cool winters were well suited for pear production. The absence of severe winds reduced the possibility of damage to the fruit during harvest season. The water-sheds to the east provided the necessary irrigation water to supplement the inadequate precipitation. The soils on the level to gently rolling land, while not the highest quality, were well adapted for pear trees. These factors along with the absence of the more prevalent pear diseases interested the early settlers to establishing the industry.

It has not been the physical factors alone that have been the localizing agents. Once the industry received its start it was up to the human element to maintain and expand the investment. The construction of the railroad provided a major stimulus. Growers developed effective cultural practices and cooperated in devising controls for disease and insect problems that eventually plagued the industry.
The minor limitations imposed by the physical elements have been reduced by the use of modern technology. The progressive packers perfected packing and storage techniques that allowed the fruit to reach the major markets in prime condition.

**Economic Impact:** In 1961 the total farm value of all agricultural products in the county amounted to $26,808,674. Of this total approximately $15,000,000 represents the market value of the pears produced in the county. Compared to the lumber industry, the number one industry in the county, the pear industry ranks a poor second. The total value of wood products from primary lumber manufacturing amounts to approximately $75,000,000.

In the basic field phase of the pear industry approximately 2500 people are employed full- or part-time. The packing and processing establishments employ between 2400 and 3000 persons. The allied industries provide employment for an additional 500 people. The wages and salaries of those employed directly or indirectly in the pear industry amount to $5,000,000.

The pear industry directly affects the 5,500 people employed in the industry and had an indirect influence on the general population of the county. The approximately 15 million dollars returned annually represents a relatively large segment of the economy.

**Outlook**

Under present and foreseeable conditions, it is the author's opinion, that the pear industry will continue to maintain its position in Jackson
County agriculture as well as its status in the pear market. The future however, is related to the growers maintaining the quality reputation of Medford pears and placing them on markets at competitive prices. This will require the combined efforts of persons engaged in all aspects of the industry; research, growing, packing, storing, and marketing.

It appears doubtful that pear acreage will be expanded greatly. Plantings will continue to be largely replacements. It does appear to be likely that the number of pear growers will decrease, while orchard units will increase in size. Increased acreages of Bartlett pears in California districts probably will cause a higher portion of Medford replants to winter varieties and a greater emphasis on marketing fruit gift boxes. There is a real need to intensify research upon profitable uses for culls as an aid to continued marketing of quality fruit. With concerted effort the pear district of Jackson County should be able to maintain its fame as the "Winter Pear Capital of the World".


34. Thingvold, Martin. Pruning and training pear trees in the Willamette Valley. Corvallis, 1962. 2 p. (Cooperative Extension Fact Sheet 15)

35. Tuttle, S. Secretary, Medford Fruit Growers League. Interview. Medford, October 1962.


